



May 11, 2023

Honorable Michael L. Parson
Governor
State of Missouri

MSSC 2022 Report on the State of Missouri's Earthquake Preparedness For Major Earthquakes

Dear Governor Parson:

In 1995, the Missouri Seismic Safety Commission (MSSC) was established, consisting of 17 members -- 15 appointed professionals from architecture, planning, fire protection, public utilities, electrical engineering, mechanical engineering, structural engineering, soils engineering, geology, seismology, local government, insurance, business, the American Red Cross and emergency management, one Missouri House appointed member and one Missouri Senate appointed member to work with various levels of government to help Missourians take steps to prepare for and reduce the effects of an earthquake. The mission of the MSSC is to review Missouri's current preparedness for major earthquakes and to make recommendations to mitigate their impact. This report summarizes the activities conducted by Commission's Members during 2022 in executing that mission.

In 2022 The MSSC returned to its normal operating procedures with in-person meetings of the commission and a number of outreach events. We have shifted from a mostly online approach during the pandemic.

Missouri Seismic Safety Commissioners volunteer to serve until replaced by newly appointed representatives. The commission continues to struggle with appointing new members to the commission. The greatest need is to appoint new members to the vacant positions. The following is a list of commissioners serving in 2022 – as you can see, there are a large number of vacant positions:

Representing	Name	Term Ends
Electrical Engineering	Dr. Phillip Gould, PE	Term Expired July 1, 2012
Fire Protection	Mr. John Mallott	Term Expired July 1, 2020
Insurance	Vacant	
Local Government	Mr. Joel P. Evans	Term Expired July 1, 2020

Public Utilities	Mr. Daryl Sorrell	Term Expired July 1, 2022
Seismology	Dr. Eric Sandvol	Term Expired July 1, 2020
Soils Engineering	Dr. Raymond Bailey, RG, PE	Term Expired July 1, 2020
Planning	Vacant	
Soils Engineering	Dr. Brent Rosenblad	Term Expired July 1, 2022
Public Education	Vacant	
Mechanical Engineering	Vacant	
American Red Cross	Vacant	
Geology	Dave Hoffman	Term expires July 1, 2026
Business	Vacant	
Emergency Management	Jim Watkins	Term expires July 1, 2026
House Appointed Member	Rep. Jamie Burger	No expiration
Senate Appointed Member	Senator Jason Bean	No expiration

The State of Missouri has taken important steps to prepare for and reduce the effects of a major earthquake as reflected in the Strategic Plan for Earthquake Safety in Missouri, first published by the MSSC in 2007. The MSSC has continued to execute the strategies laid out in the updated strategic plan. This includes a three tiered approach:

- (1) Work with State Government to help advise to state on how to prepare for a large seismic event
- (2) Promote Earthquake awareness across the state
- (3) Conduct Rapid Visual Screening (RVS)

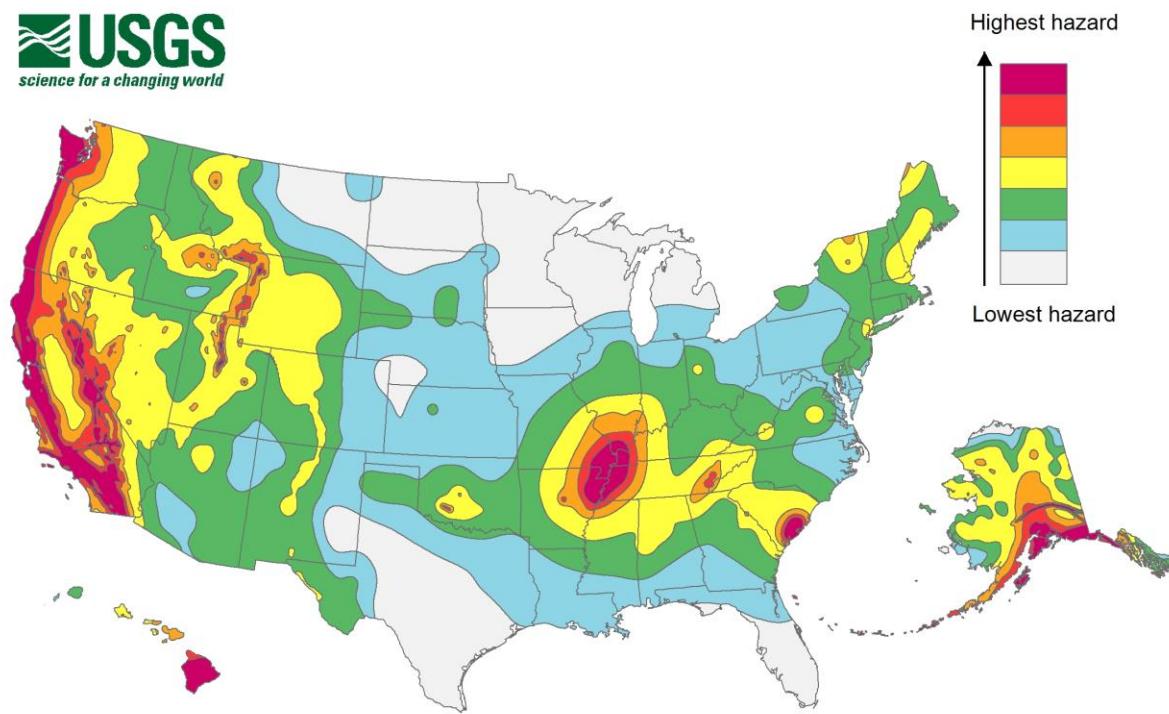


Figure 1. The USGS's updated 2018 hazard map for the lower 48 states. This is the USGS's longer term earthquake hazard model. It is worth noting that the longer term earthquake hazard in the New Madrid Seismic Zone is roughly equivalent to California and Alaska.

Past earthquakes have caused great damage in the central region of the United States, and there is broad agreement in the scientific community that there is a continuing concern for a major earthquake that would put structures and communities in Saint Louis and southeast Missouri vulnerable to damage from severe ground shaking. An open file report from the United States Geological Survey has reaffirmed that there is significant reason to plan for a significant seismic event in the New Madrid Seismic Zone.

MSSC RVS Program

The Missouri Seismic Safety Commission is leading a very important program to improve earthquake safety and readiness in Missouri schools. The Commission works with structural engineers, architects, and construction professionals to conduct “rapid visual screenings” for potential seismic hazards of school buildings. These screenings:

- Are provided free of charge to participating school districts
- Help determine earthquake-readiness of school buildings and district facilities
- Provide preliminary recommendations to improve school safety
- Can be used to prioritize structural retrofit or non-structural improvements
- Use FEMA-approved methodology known as “FEMA P-154”

To date, 23 school districts in southeast Missouri have been evaluated through this program.

The earthquake threat to Missouri cannot be ignored. The Strategic Plan for Earthquakes in Missouri developed tangible, practical recommendations and procedures to prepare Missouri for future earthquakes as well as other hazards, such as tornadoes and strong storms, at the same time. An example of the kind of damage from Mw 7.0 earthquakes is shown in Figure 2. This is the kind of damage that can result from unreinforced masonry construction.

The MSSC has conducted a large number RVS screenings and have gotten to the point where there are not very many willing school districts left. We are therefore working to expand this program to include Rapid Visual Screening of other critical infrastructure such as hospitals.

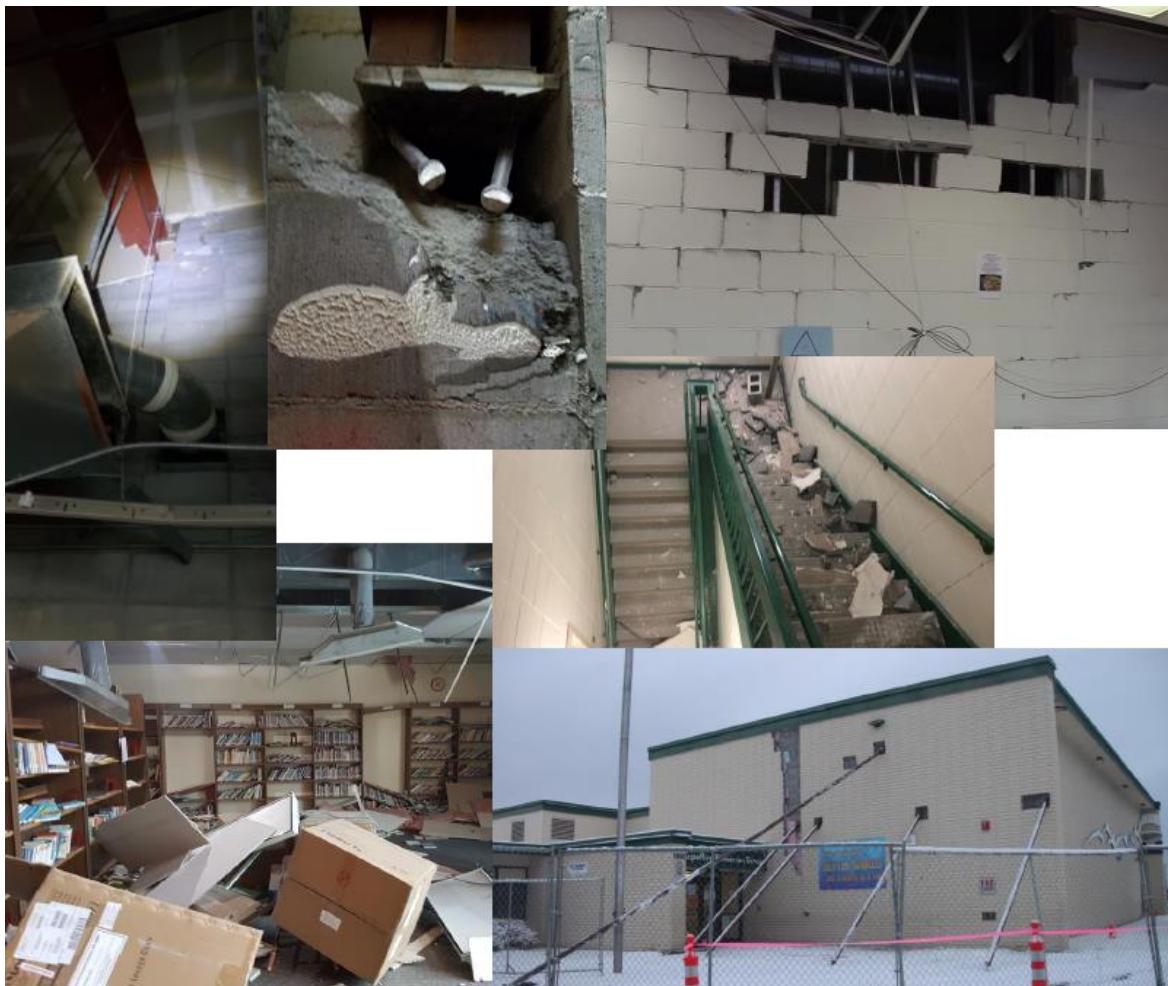


Figure 2. Examples of school damage at Houston Middle School in from 2018 Mw 7.1 earthquake in Anchorage Alaska. The 1811-1812 Earthquake was likely of similar size, possibly larger than this 2018 event. This slide was taken from a 2022 presentation by Janise Rodgers et al., from the University of Alaska (Courtesy Commissioner Phil Gould).

Objective 1: Increase Earthquake Awareness and Education

Strategy 1.1 - Promote Awareness among the general public.

- February 2022 was Earthquake Awareness Month in Missouri and was highlighted by presentations, media coverage, social media activities and demonstrations throughout the state.
- The 4th annual Earthquake Summit was held March 3 at the St. Louis Science Center. More than 300 attended this professional development conference to learn the latest about earthquakes in the Midwest – the risk, preparedness strategies and recovery planning. Experts from across the country led sessions focused on the latest geology, best practices in earthquake planning and response, transportation technologies, school recovery, public health lessons learned, funding opportunities, and more.



Figure 3. The Earthquake Summit at the St. Louis Science Center attracted more than 300 participants.

- Over the course of the year a few updates were made to the MSSC website ([Seismic Safety Commission | SEMA \(mo.gov\)](#)) providing Missourians access to earthquake information and updates on disaster preparedness.
- On October 20 the Great Central U.S. ShakeOut earthquake drill was held throughout the region, with more than 390,000 registered participants in Missouri.
- The commission participates in the SciFest Safety Expo, which drew 3,000 attendees to the St. Louis Science Center. Information tables and presentations throughout the day displayed the risk and preparedness steps to increase earthquake resilience.

Strategy 1.2 - Promote Awareness among key professionals in critical fields.

- The MSSC sponsored an Earthquake Insurance symposium on May 23-24 in St. Louis. The event brought together insurance industry leaders, as well as state and federal earthquake planners and insurance experts, to begin to address the lack of affordable earthquake insurance in southeast Missouri, as well as the New Madrid region.

- As part of the ShakeOut earthquake drill October 20, SEMA Earthquake Program Manager Jeff Briggs ran a number of media events in coordination with the MSSC.
- The commission sponsors the Earthquake Insight field trip, taking interested professionals and students to the New Madrid Seismic Zone to study the geology and history of the area. After several pandemic-induced postponements, the event resumed November 4-6.

Objective 2: Reduce Earthquake Hazard Through Mitigation

Strategy 2.1 - Promote adoption/enforcement of technically sound & feasible building codes.

- Monitored and offered support for the establishment of local building standards.

Strategy 2.2 – Identify existing essential facilities and schools susceptible to EQ damage. The MSSC continued its study using volunteers to conduct a Rapid Visualization Screening (RVS) that reported on the vulnerability of school facilities to failure in a seismic event (Figure 2). The study identified the vulnerability of a majority of the older school facilities in the southeastern region of Missouri, noted inexpensive corrections that should reduce school children's and staff person's morbidity and mortality from future earthquakes, and recommended that the school districts in the 46 counties in southeastern Missouri that are considered to be "at risk" from a major earthquake request an enhanced Rapid Visual Assessment Screening (RVS) under the auspices of MSSC using volunteer professionals provided by professional societies or contract for an evaluation by a qualified engineer.

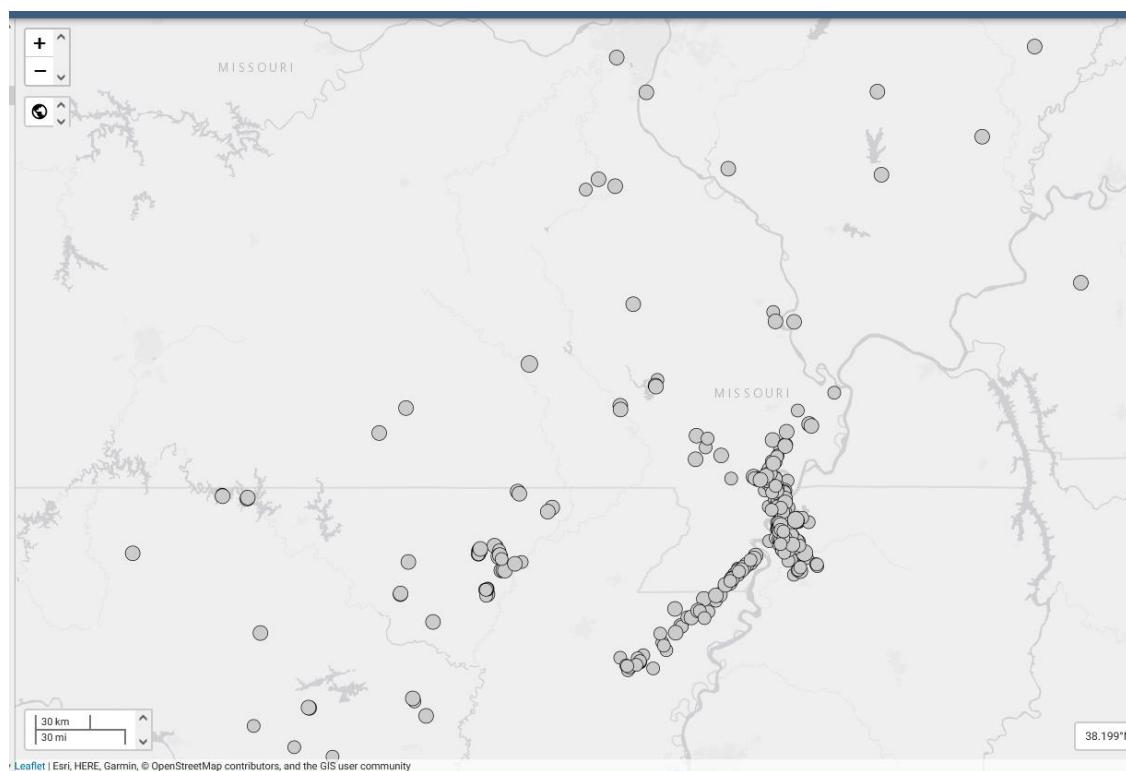


Figure 4. All of the earthquakes in the New Madrid Seismic Zone and surrounding regions that were located for the year 2022. Nearly all of these events are between Magnitude 1. and 2 with the largest being a magnitude 3.2.

- The MSSC has agreed that a RVS database will be housed at SEMA and will continually be updated as additional evaluations are completed.
- During the year 2022, Stoddard and Scott County follow-ups were completed
- In addition to the creation of reports, the MSSC commissioners have conducted follow up visits for past RVS visits. The visits are designed to monitor and encourage mitigation efforts in School district in the NMSZ that we have conducted a RVS visit and generated an extensive report. These visits also help the MSSC to understand how to better aid school districts in preparing for major seismic events.

Objective 4: Improve Recovery

Strategy 4.3 – Promote funding and training of post-earthquake building inspection.

- MSSC received FEMA funds to support travel expenses for volunteers and support staff to coordinate the assignment of teams to conduct Rapid Visual Assessment (RVA) screening evaluations and training for team leaders.

Major earthquakes in the central US are rare, but can affect a large geographical area, challenging the state resources to respond. The lessons learned from past U.S. earthquakes have demonstrated the significant burden placed on surviving families, businesses, utilities and state agencies. Preparation in the short term will yield significant reductions in fatalities, casualties, damaged structures, business failures, and state infrastructure losses from earthquakes. The same actions will also reduce the impact of other natural hazards. The MSSC will endeavor to continue making progress towards achieving the objectives presented in the Strategic Plan for Earthquake Safety during the next twelve months.

Respectfully submitted,



Eric Sandvol
Chair, Missouri Seismic Safety Commission